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BOARD OF FISH COMMISSIONERS

THE
AMPHIBIANS and REPTILES
OF PENNSYLVANIA

HARRISBURG, PA.
1949

38.31

The drawing on the cover, by Dr. Grace L. Orton, shows a male spring peeper, harbinger of spring, in the act of calling.

The
AMPHIBIANS and REPTILES
# of PENNSYLVANIA

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INTRODUCTION

In 1939, several of my earlier articles dealing with Pennsylvania amphibians and reptiles were reprinted, together with one new contribution, in the Biennial Report of the Board of Fish Commissioners for 1936-38. Unsatisfactory as this conglomeration was, it supplied a need for non-technical information about herpetology. Recently the supply of this pamphlet was exhausted and a re-issue was decided upon. Commissioner French kindly permitted me to delay the reprinting for several weeks in order to rewrite the material in its entirety.

In spite of the pressure of time, I have tried to do several things to make this pamphlet more usable. *First,* I have subordinated scientific names by listing them in second place in all headings. I have omitted the name of the describer of each animal, since this is unneeded, and often confusing, in a report of this type. *Secondly,* I have endeavored to use everyday language without sacrificing accuracy. Scientists grow so accustomed to technical jargon and to stereotyped arrangement that saying the same thing in other words and in different order means exertion beyond the call of duty. I don't expect to be decorated for this labor, for the result still leaves much to be desired, but I believe that the discussions have been somewhat enlivened and will prove to be more readable. *Thirdly,* I have tried to add new information resulting from recent studies, without adding to the length of the pamphlet. Anyone who believes that herpetology is a dead subject need only compare the names used here with those in the earlier edition to be convinced otherwise. Many of the two word scientific names (binomials) have now become three word jaw-breakers (trinomials). Scientists don't make these changes just to annoy you; each one is necessitated by some new discovery, often the result of months of hard delving. Thus, Dr. Harper demonstrated that the spring peeper of Georgia and Florida differs noticeably from its northern relatives and christened it *Hyla crucifer bartramiana.* Immediately, our spring peeper, *Hyla crucifier,* became entitled to a repetition of its second (specific) name. *Hyla crucifer crucifer* is the scientist's way of saying "the real McCoy" or "the original spring peeper." Those who criticize such changes should remember that in our human species changing names, of females particularly, is an established custom.

This revised list is based upon the Carnegie Museum's Pennsylvania collection, upon the records which I have accumulated during the past twenty years, and upon the writings of herpetological colleagues, too numerous to be credited individually. In 1939 our collection, although large, was weak in specimens from the eastern portion of the State. During recent years, however, Mr. Roger Conant, of the Philadelphia Zoological Garden, and other good friends in eastern Pennsylvania, have contributed many specimens from eastern counties. The Carnegie Museum collection now includes about 5000 amphibians and 2000 reptiles collected in Pennsylvania during the past fifty years. The need for large collections is evidenced by the garter snake, of which we have a total of 425 Pennsylvania specimens without having yet acquired a specimen from each of the 67 counties.

It is hoped that this article will stimulate interested persons to send specimens of each species encountered to the Section of Herpetology, Carnegie Museum, Pittsburgh 13, Pa., where material is being assembled for comprehensive work on the *Herpetology of Pennsylvania.* Each specimen should be accompanied by a label stating the exact locality and date of collection, and the name and address of the sender. Directions for collecting, preserving, or shipping will be supplied upon request. Each donor will be sent a list of his specimens correctly identified.

FOR FURTHER REFERENCE

No pamphlet can supply more than a few facts about each species treated. Serious students should consult the following handbooks, which constitute a basic herpetological reference library:

BISHOP, SHERMAN C.

1943. Handbook of salamanders: the salamanders of the United States, of Canada, and of Lower California. Ithaca: Comstock Publ. Co. xiv + 555 p., frontis. in color, 144 figs., 56 maps. $5.00.

POPE, CLIFFORD H.

1939. Turtles of the United States and Canada. New York: Alfred A. Knopf. xviii + 343 p., 99 illus. $3.75.

SCHMIDT, KARL P., AND D. DWIGHT DAVIS

1941. Field book of snakes of the United States and Canada. New York: G. P. Putnam's Sons. xiii + 365 p., 34 pl. (4 colored), 103 figs. $3.50.

SMITH, HOBART M.

1946. Handbook of lizards: lizards of the United States and of Canada. Ithaca: Comstock Publ. Co. xxi + 557 p., over 300 illus. $5.75.

WRIGHT, ANNA ALLEN, AND ALBERT HAZEN WRIGHT

1942. Handbook of frogs and toads: the frogs and toads of the United States and Canada. Ithaca: Comstock Publ. Co. xi + 286 p., 88 pl. $3.00.

PENNSYLVANIA AMPHIBIANS AND REPTILES IN ORDER OF APPROXIMATE SIZE

It is unscientific to attempt to identify animals by size alone, but size often aids in identification. Furthermore, nearly everyone is interested in the "biggest specimen ever killed" whether it be a woodchuck or a wood frog.

In the following tables I have listed the largest specimen that has come to my attention or the greatest size published for the species, regardless of whether the record was based on a Pennsylvania specimen or not. In the few instances where one of our local specimens holds the record, a notation to this effect has been added.

I should like to ask readers of this pamphlet to send me reports of any unusually large specimens, or, better still, to send the specimens for the Carnegie Museum collection. At some future date I should like to list both the largest known specimen of each species and the largest Pennsylvania specimen.

SALAMANDERS

(The figures given are total length, from tip of snout to end of tail.)

3 inches—Four-toed Salamander
4 inches—Allegheny Mountain Salamander
4½ inches—Northern Two-lined Salamander
5 Eastern Red-spotted Newt
5 inches—Marbled Salamander
5 inches—Eastern Red-spotted Newt
5¼ inches—Northern Dusky Salamander
5¼ inches—Seal Salamander
5½ inches—Ravine Salamander
6 inches—Wehrle's Salamander
6¼ inches—Long-tailed Salamander
6½ inches—Northern Red Salamander
7 inches—Piedmont Mud Salamander
7¼ inches—Jefferson's Salamander
7⅜ inches—Eastern Slimy Salamander (Pittsburgh, Pa., female)
7½ inches—Northeastern Purple Salamander
9 inches—Spotted Salamander
10 inches—Eastern Tiger Salamander
17 inches—Central Mudpuppy
27 inches—Eastern Hellbender (males reach only 22 inches)

FROGS

(The measurement given is head-and-body length, from tip of snout to rear of body with the frog in a sitting position.)

In Pennsylvania the female holds the size record in each species.

1¼ inches—Cricket Frog
1⅓ inches—Eastern Chorus Frog
1⅜ inches—Spring Peeper
1½ inches—Western Chorus Frog
1½ inches—Mountain Chorus Frog
2⅜ inches—Gray Tree Frog
2⅞ inches—Eastern Spadefoot Toad
3⅛ inches—Pickerel Frog
3¼ inches—Fowler's Toad
3¼ inches—Southern Wood Frog
4 inches—Leopard Frog
4 inches—Green Frog
4¼ inches—American Toad
10 inches—Bullfrog

TURTLES

(The overall length of the upper shell or carapace is measured as a straight line with calipers, *not following the curve with a tape.*)

4 inches—Muhlenberg's Turtle
4½ inches—Northern Mud Turtle
5 inches—Spotted Turtle
5⅓ inches—Musk Turtle (Indiana specimen)
6½ inches—Eastern Box Turtle (New York male)
7⅛ inches—Eastern Painted Turtle (New York female)
7⅓ inches—Central Painted Turtle (Wisconsin female)
9 inches—Wood Turtle
10 inches—Blanding's Turtle
10¾ inches—Map Turtle (Indiana specimen)
14 inches—Spineless Soft-shelled Turtle
15 inches—Spiny Soft-shelled Turtle (males reach only 8 inches)
18 inches—Red-bellied Turtle (males reach only 12 inches)
18 inches—Northern Snapping Turtle (may weigh over 60 pounds)

LIZARDS

(Measured from tip of snout to end of tail—in specimens which have not lost their tails!)

5 inches—Black Skink
7¼ inches—Northern Fence Lizard
7½ inches—Blue-tailed Skink
11 inches—Broad-headed Skink

SNAKES

(Should be measured from tip of snout to tip of tail *in the flesh!* Skin measurements are not reliable, for the skin may be stretched 30 per cent or more in removal.)

9 inches—Eastern Ground Snake
12½ inches—Eastern Worm Snake
15⅛ inches—Northern Red-bellied Snake
17¼ inches—Dekay's Brown Snake
20 inches—Small-headed Garter Snake (Pennsylvania female)
21 inches—Kirtland's Water Snake
21 inches—Northern Ring-necked Snake
24 inches—Eastern Smooth Green Snake
32 inches—Eastern Ribbon Snake
33 inches—Queen Water Snake
3 feet 6 inches—Eastern Massasauga
3 feet 6 inches—Rough Green Snake
3 feet 6 inches—Northern Hog-nosed Snake
3 feet 6½ inches—Upland House Snake
3 feet 8 inches—Eastern Garter Snake
4 feet 3 inches—Northern Banded Water Snake
4 feet 5 inches—Northern Copperhead (Georgia specimen)
5 feet 9 inches—Eastern King Snake
5 feet 11 inches—Black Racer (Wilkinsburg, Pa., specimen)
6 feet 2 inches—Timber Rattlesnake
8 feet 5 inches—Pilot Blacksnake

AMPHIBIANS—CLASS AMPHIBIA

Amphibians are cold-blooded animals; that is, the temperature of their blood varies with that of their surroundings. In this respect they agree with the fishes and reptiles, and differ from the birds and mammals which maintain a high, and relatively constant, blood temperature irrespective of their surroundings. Amphibians have a soft, naked skin, which may be smooth or rough, but which is well-provided with glands to keep it moist. If scales are present, as in the caecilians, they are tiny and hidden in the skin. Most amphibians lay their eggs in water where the young pass through a larval or tadpole stage, during which they breathe by means of gills. Numerous species, however, lay large-yoked, shell-less eggs, on land, in which the young pass through their larval stage. A few species produce living young. There are about 2350 kinds of living amphibians, which are divided into three orders. One order—Gymnophiona or Apoda, the caecilians—which includes only about sixty species of blind, limbless, wormlike animals does not occur in the United States. The remaining two orders are listed below.

SALAMANDERS—ORDER CAUDATA

Salamanders are frequently, and erroneously, called "water lizards." True lizards are reptiles and have a scaly coat; salamanders are similar in form but have a smooth moist skin like their relatives, the frogs.

All salamanders differ from frogs in having tails throughout life and hindlegs which are only slightly larger than their forelegs. Their larvae, instead of being of the polliwog type, resemble their parents even to the possession of teeth in both jaws. All of the local species have two pairs of legs. Only one, the mudpuppy, retains external gills throughout life. They are generally restricted to cool, moist habitats, and they are most active at night, at which time most species display a tendency to climb onto the leaves of plants, fallen branches, or rocks in stream beds. Salamanders are practically voiceless, but some species utter a faint squeak when handled. Many species have brittle tails which break off readily and which are easily replaced by the growth of a new tail. Many secrete mucus which might be harmful if rubbed into the eyes or mouth, but which does not irritate the skin. Only a few species attempt to bite, and the bites of these few are never poisonous and rarely powerful enough to break the skin. The hellbender and mudpuppy are considered edible. The same two species are greatly feared by fishermen, without any reason, although it must be admitted that their appearance is rather unlovely.

Most herpetologists divide the living salamanders into eight families and about 300 species and subspecies. Five families and 20 kinds occur in Pennsylvania.

Mudpuppies—Family Proteidae

1. Central Mudpuppy, *Necturus maculosus maculosus*

This species is easily distinguished from all other Pennsylvania salamanders by the presence of three bushy, bright red gills on each side of the neck. It has been called the "Peter Pan" of salamanders, for it never grows up. Other local salamanders have external gills only during the larval stage, but the mudpuppy never loses its gills and never leaves the water. The smooth skin may be brown or gray in color, with several rows of round, dark spots on the back. Young specimens are brown with a light stripe on each side of the back, which extends from snout to tail tip. The mudpuppy rests on the bottom of streams and lakes during the day, and feeds at night on crayfish, small fish, worms and insects. During the summer it lays about sixty pea-sized eggs under a board or stone in the water. Although it has been found in Pennsylvania in the Lake Erie, Ohio, Susquehanna, and Delaware drainages, it is most common in the Ohio Drainage and in Lake Erie. The Delaware record may be based upon escaped or introduced specimens.

GIANT SALAMANDERS—FAMILY CRYPTOBRANCHIDAE .

In addition to the American hellbenders, this family includes the largest living salamander, the giant salamander of China and Japan, which attains a length of over five feet.

2. Eastern Hellbender, *Cryptobranchus alleganiensis*

The hellbender is the largest and ugliest salamander in Pennsylvania. It is gray, red-brown or dark brown in color with a broad, flat head and flattened body. There are folds of loose skin along the sides and on the hind margins of the legs. The eyes are very small and without eyelids; gill slits are present. The completely aquatic hellbender crawls along the bottoms of streams, feeding principally upon crayfish, supplemented by fish, worms, mussels, insects, and even its own eggs. Hellbenders eat more dead than living fish and small hellbenders are eaten by fish, so the fish versus hellbender score is about tied. In August or September, the 300 to 450 eggs are laid in long rosary-like strings in a saucer-shaped depression under a rock in the stream bed and fertilized externally, something unique among American salamanders. The hellbender, although completely harmless, is greatly feared by fishermen, many of whom will cut their lines rather than remove one from the hook. Laymen frequently confuse it with the mudpuppy (No. 1 in this list). The hellbender occurs in the larger, rocky bottomed, and unpolluted or slightly polluted streams of the Ohio Drainage, and it has also reached the Susquehanna Drainage, probably by stream capture.

NEWTS—FAMILY SALAMANDRIDAE

3. Eastern Red-spotted Newt, *Triturus viridescens viridescens*

This species, which is familiar to most aquarium fanciers, can be recognized by the presence of from one to eight or more red dots, encircled with black, on each side of the olive-green body. The belly is yellow with black polka dots. Several hundred eggs are laid in the spring, attached singly to the leaves of plants under water. The larvae may transform in the late summer and live on land for two or three years as scarlet "efts," or they may skip a terrestrial interlude and remain in the water throughout life. The newt probably occurs in every county, since it has been recorded from 57.

BLUNT-NOSED SALAMANDERS—FAMILY AMBYSTOMIDAE

4. Jefferson's Salamander, *Ambystoma jeffersonianum*

This species is dark gray or black in color, often marked with a sprinkling of small bluish silver spots. It may be distinguished from the slimy salamander, which it resembles in coloring, by its phenomenally long and slender toes. It is rarely found except in very early spring, when it migrates to ponds to breed. During the remainder of the year it lives a quiet life underground. Each female lays several masses of 7 to 40 eggs, attached to sticks or other supports below the water surface. The eggs hatch in from four to six weeks, and the larvae transform in mid-summer and then leave the ponds. Eventually this species may be found throughout the State, since it has been recorded from 22 scattered counties, but in many areas it is the hardest salamander to collect.

5. Spotted Salamander, *Ambystoma maculatum*

This salamander is aptly named, for its purplish-black body forms a velvet background for two rows of large yellow or orange spots which extend from head to tail tip. An early spring rain rouses this salamander from its winter snooze, it treks to the nearest pond in chill rain, and indulges in a courtship performance rivalling an aquacade even before the water is free of ice. The eggs, enclosed in jelly, are laid in cottony-white or transparent masses the size of a woman's fist. After breeding, the adults leave the ponds and disappear underground, only occasionally being encountered in a drainpipe or excavation. The spotted salamander probably occurs in every county in Pennsylvania, for it has been recorded from 52 counties to date.

6. Marbled Salamander, *Ambystoma opacum*

This species is black with a series of about fourteen gray or white, hourglass-shaped markings crossing the back and tail. Unlike other local salamanders, this species mates in the autumn. The female lays her eggs in a depression or near a pond margin and usually guards them until they are flooded by fall rains. The species has been recorded from 13 counties, distributed from Northampton County in the east to Crawford County in the west, but it remains one of the least known salamanders in western Pennsylvania.

7. Eastern Tiger Salamander, *Ambystoma tigrinum tigrinum*

This salamander is marked with yellow spots as is the spotted salamander, but the spots are more numerous and irregular, and the belly tends to be mottled with yellow as well. The egg masses are deposited in ponds in the spring, generally attached to leaves or to the stems of water plants. This species is a coastal plain form in the eastern part of its range, and it is consequently rare in Pennsylvania. One specimen was found almost a century ago at Londongrove, Chester County, and there appears to be little reason to question this record. In 1938, I reported having received four specimens reputed to have been collected in 1911, at Wexford, Allegheny County. As the years pass without relocation of the species in western Pennsylvania, I become increasingly skeptical of this record.

Lungless Salamanders—Family Plethodontidae

This is the most thriving family of salamanders at the present time, for the majority of living salamanders belong to it. The family got its start in the southern Appalachians where mountain brooks are one of the important habitats. Consequently, every member of the family, regardless of how far it has traveled from the ancestral home, still retains a groove from each nostril to the upper lip—originally developed to drain the nostrils as the salamanders lifted their heads above water!

8. Northern Dusky Salamander, *Desmognathus fuscus fuscus*

This, the most common salamander in Pennsylvania, is extremely variable in pattern, coloration, and size. Young specimens are often yellow-, red-, or gray-brown with hazy, lighter blotches upon the back. Old specimens often become uniform dark brown or gray. The species occurs in nearly every moist or wet habitat—along streams, in wet leaves, in mud, in wet shale outcrops. Its 12 to 26 eggs are deposited in moist cavities near water from June to August. There are easily more dusky salamanders in Pennsylvania alone than there are people in the entire world. The species has not yet been recorded from Erie, Schuylkill, or Snyder counties, probably because local residents have considered it too common to bother sending to any museum!

9. Seal Salamander, *Desmognathus monticola*

This salamander is brown in color, heavily mottled above with cream, yellowish, or reddish spots margined with black scallops. It is stouter, more powerful, and more aquatic than the dusky. It frequents cool mountain streams and waterfalls, where it attaches its eggs to the under surface of stones. It has been found only in Allegheny, Armstrong, Bedford, Clearfield, Fayette, Greene, Indiana, Somerset, and Westmoreland counties.

10. Allegheny Mountain Salamander, *Desmognathus ochrophaeus ochrophaeus*

The back of this slender salamander varies in color from bright red or yellow to dull brown or black. There is usually a row of dark dots along the center of the back. It wanders farther from streams than does its cousin, the dusky, and is frequently found under leaves or logs in the woods. It is less tolerant of warmth than the dusky, however; in cool, hemlock-shaded ravines it is the most common salamander, whereas in warmer southeastern Pennsylvania it is unknown. Clusters of 11 to 14 eggs may be found under stones or logs on wet hillsides in autumn, and possibly in early spring as well. This species has been found in 36 northern and western counties thus far.

11. Eastern Red-backed Salamander, *Plethodon cinereus cinereus*

This extremely common terrestrial salamander is slender and trim. Its back may be bright red, red sprinkled with black, or uniform gray or black, but its belly is always finely mottled with black and white, producing a salt-and-pepper effect. In summer, from 3 to 13 eggs are hung like a bunch of grapes in cavities in rotten logs, or under logs or stones in the woods, and the hatchlings never go near the water! The red-back is distributed throughout Pennsylvania, with records for 55 counties.

12. Eastern Slimy Salamander, *Plethodon glutinosus glutinosus*

This large, stout species is black, more or less spotted with white, and it is aptly named, for when roughly handled it secretes considerable slime, which is perfectly harmless on the hands, but which is difficult to wash off. It occurs in the woods and near cliffs, under much the same conditions as the red-back, but generally under larger rocks and logs. Every rock too large to turn over probably has a slimy salamander under it. In spite of its abundance, little is known of the private life of the slimy. Eggs have been found only a few times, in Arkansas caves and once under a stump in West Virginia. It has been taken in 61 counties in Pennsylvania, and must occur in every one.

13. Ravine Salamander, *Plethodon richmondi*

This species is similar to *Plethodon cinereus,* but it attains a greater length, it never displays a bright red stripe on the back, and its belly is dark brownish-black faintly sprinkled with minute white dots, but never mottled in a salt-and-pepper fashion. Its breeding and feeding habits are as yet unknown. Its preferred habitat is on the sides of valleys, often near limestone outcrops, rather than on the hilltops or valley floors. It aestivates during the summer months, so it should be searched for in May-June and September-October. Spring-collected specimens have noticeably swollen tails, which may indicate food storage for the period of aestivation. To date, it has been recorded only in Allegheny, Bedford, Blair, Greene, Huntingdon, and Indiana counties.

14. Wehrle's Salamander, *Plethodon wehrlei*

This species resembles the slimy salamander, but its throat is generally whiter, it is usually more slender, and its white spots, instead of being sprinkled over the body, tend to form a row along each side of the body. The breeding and feeding habits of this salamander are virtually unknown. It has been collected in Clarion, Greene, Indiana, McKean, Mercer, and Westmoreland counties; in the last mentioned county Mr. R. D. Hamilton found it to be abundant.

15. Four-toed Salamander, *Hemidactylium scutatum*

This, the smallest Pennsylvania salamander, is easily identified. It has a glistening white belly flecked with black spots, a groove around the base of the tail to facilitate detachment in time of danger, and four, instead of the usual five, toes on the hind feet. The eggs are laid in April or May in clumps of sphagnum or moss overhanging water, so that when the eggs hatch the larvae may drop into the water to begin their brief larval existence. Often several females use the same nest-site, thus relieving all except one of the task of guarding the eggs. The four-toed salamander is common, but rarely caught except by trained collectors who visit bogs or wet meadows in laying season. It has been collected in 30 scattered counties.

16. Northeastern Purple Salamander, *Gyrinophilus porphyriticus porphyriticus*

The color of this salamander is not purple, but pinkish or salmon clouded with brown. It is readily identified by a cream colored line which extends from the eye to the nostril on each side of the head. It inhabits farmers' spring houses and cold mountain springs and streams, and feeds upon other salamanders, worms, insect larvae, and spiders. Its life history is incompletely known, in spite of the ease with which it may be collected. Relatively large eggs are laid separately, on the under surface of stones in running water, during the summer. There are 54 county records for this species, representing all parts of the State except the Philadelphia region.

17. Piedmont Mud Salamander, *Pseudotriton montanus montanus*

This dull red salamander is distinguished from the next species by the fact that it has only a few scattered black spots on the body. It lives in or near muddy springs and streams. Although moderately common from Maryland to Georgia, this species has not been collected in Pennsylvania since the original specimens were obtained near Carlisle, Cumberland County, in 1849!

18. Northern Red Salamander, *Pseudotriton ruber ruber*

This bright red salamander is plentifully sprinkled with black dots, which may fuse in old specimens so that only a little red is visible. It is most easily collected by visiting springs or by wading up cold mountain streams at night, but it may be found hiding by day under bark or debris in damp places. It feeds on other salamanders, insect larvae, worms, snails, and slugs, and lays its eggs in autumn on the under surface of stones in cold running water. The species occurs throughout the State since it has been taken in 53 scattered counties.

19. Northern Two-lined Salamander, *Eurycea bislineata bislineata*

This slim and dapper salamander ranges from golden yellow to dark brown in color, and its back is bordered on each side with a black line. The species is common in leaf mold and under stones in moist woods and along streams. From 12 to 68 eggs are laid on the under surface of a stone in running water in late spring. The two-lined has been collected in 53 counties, so it must occur throughout the State.

20. Long-tailed Salamander, *Eurycea longicauda longicauda*

This species is bright yellow in color, and the long tail, which is responsible for its name, displays a row of black herring-bone markings on each side. It occurs under logs and stones in the woods, under debris in stream bottoms, and in springs and caves. It has been taken in 52 counties, so it probably occurs throughout the State.

The eggs of this species were not discovered until January 2, 1943! Charles E. Mohr, the outstanding student of Pennsylvania cave life, found them attached to the tops and sides of rocks and to the edges of submerged boards in running water in a mine near Audubon, Montgomery County. This is an excellent example of how much remains to be learned about the life histories of some of our common amphibians and reptiles.

FROGS AND TOADS—ORDER SALIENTIA

Toads and frogs have two pairs of legs, the hind pair being enlarged for jumping and having four segments instead of three as in salamanders. All of the local kinds lay pigmented eggs in water, usually in long strings (Bufos) or in large masses (Ranas). Tails are present only in the larval, or tadpole, stage. Local tadpoles vary in size at time of transformation, which may come one to twenty-four months after hatching in different species, from less than one inch in length (toads) to almost six inches (bullfrog). Most species are more active at night than in the daytime. The males of practically all species have a distinctive call, which is uttered, with the mouth closed, by means of a vocal sac which only the males possess. When injured or annoyed, both males and females can scream or cry with the mouth open. The vocal sac is generally located under the chin, but may be placed elsewhere, as in the leopard frog, which has a small sac on either side of the head between the ear and shoulder. A few tropical species may cause slight injury by biting, stabbing, or their powerful secretions may irritate the skin, but no frog or toad is really dangerous to man. The green frog and the bullfrog are the only local species which are large enough to be used as food.

The living frogs are divided into fourteen families and about 2000 species. Four families and fourteen kinds are represented in this state.

SPADEFOOT TOADS—FAMILY PELOBATIDAE

21. Eastern Spadefoot Toad, *Scaphiopus holbrookii holbrookii*

This burrowing species has an enlarged digging spade on each hind foot. In daylight the pupils of its eyes contract to vertical slits, so it may be distinguished from all other Pennsylvania frogs by "looking it squarely in the eye." Spadefoots live so quietly in individual burrows in suitably sandy places that their presence in an area is often unsuspected until torrential rains, instead of dampening their ardor, stimulate them to lay their eggs in flooded places. At such times the coarse calling of unbelievable numbers of males brings them unfavorably to the notice of local residents. In Pennsylvania the spadefoot has been collected only in the Susquehanna and Delaware drainages in Delaware, Franklin, Monroe, Montgomery, and Northumberland counties.

TOADS—FAMILY BUFONIDAE

The local species have the warty skin and prominent bumps behind the head (parotoid glands) which serve to distinguish most toads from all other kinds of frogs. Toads secrete mucus which protects them from some animal enemies, but not from one of their deadliest enemies —the automobile. They do not cause warts!

22. American Toad, *Bufo terrestris americanus*

This once familiar toad in gardens generally has a black-spotted belly, only one or two warts within each dorsal spot, and large warts upon the upper surfaces of the hind legs. The melodious trilling of the males on warm spring nights entices the females to ponds or flooded depressions where they lay about 4,000 eggs in long strings.

The economic value of toads is so great that it is very regrettable that they are becoming increasingly scarce, as a result of the drainage of breeding sites, the automobile toll, and other causes. Winnie, our much publicized laboratory pet, has lapped up noxious creatures ranging from cutworms to a black widow spider, and on one occasion consumed 152 Mexican bean beetles within one hour!

The American toad has been recorded from 58 counties.

23. Fowler's Toad, *Bufo woodhousii fowleri*

This gray or gray-green nattily marked toad is an inhabitant, primarily, of river banks and lake and ocean beaches. It can generally be distinguished from the American toad by its immaculate or lightly spotted belly, by the presence of more than two warts within each dorsal spot, and by the absence of large warts upon the upper surfaces of the hind legs. The two species have very distinct calls; Fowler's harsh bleat bears little resemblance to the American's soft, sweet trill. The egg strings of the two are superficially similar, but Fowler's are generally laid about a month later and in moving rather than in quiet water. In Pennsylvania this species has been found in 29 scattered counties.

TREE FROGS—FAMILY HYLIDAE

The frogs of this family possess adhesive disks on the tips of the fingers and toes. The six local species may be separated, partially, by the difference in size of the disks and by the amount of webbing present. Thus, *Acris* has very small disks, and toes which are almost completely webbed; the forms of *Pseudacris* have very small disks, and toes which are slightly webbed; and the forms of *Hyla* have prominent disks which are moderate in size in the spring peeper, and large in size in the gray tree frog.

24. Cricket Frog, *Acris crepitans*

This rough-skinned frog derives its name from its rattling, cricket-like song which really sounds like two pebbles being struck together. The cricket frog changes its color readily, leaps into the water with great agility when disturbed, and feeds upon insects. It has been recorded from 11 counties in the southeastern corner of the State, and from Allegheny and Potter counties as well. In western Pennsylvania today the cricket frog is a collector's prize, for it is either very rare or very much restricted in distribution.

25. Mountain Chorus Frog, *Pseudacris brachyphona*

The few dark accent marks or blotches which this species displays on its back sometimes bear a faint resemblance to a cross and cause it to be confused with the spring peeper. Its skin is rougher, however, its disks are smaller, and frequently it has yellow markings on the hind legs. The call of a single male reminds me of an ungreased wagon wheel complaining at each revolution. A chorus of this species is deafening at close hand, but the call does not have the carrying quality of that of the spring peeper. When the two are breeding together, as frequently occurs, only the peeper chorus will be heard a quarter of a mile distant. The eggs are deposited in March or April, often in the temporary water of small ditches and marshes. It has been collected in Allegheny, Beaver, Blair, Fayette, Indiana, and Westmoreland counties only.

26. Eastern Chorus Frog, *Pseudacris nigrita feriarum*

This frog is marked with three, more or less broken, longitudinal dark stripes on the back. It is difficult to separate from its western cousin except by locality. It has been collected in Berks, Bucks, Carbon, Chester, Cumberland, Franklin, and Huntingdon counties only.

27. Western Chorus Frog, *Pseudacris nigrita triseriata*

The markings of this form are essentially the same as the preceding, although the three dark stripes are more frequently broken up into rows of spots. It has been collected in Allegheny, Butler, Forest, and Venango counties only, and is restricted presumably to the Appalachian Plateaus region.

28. Spring Peeper, *Hyla crucifer crucifer*

The piercing, bird-like whistle of this tiny, smooth-skinned species is the earliest frog voice each year. It may be heard during warm spells in January and February but breeding does not begin until March. Although few of the multitude of persons who know its call have ever seen the singer, I believe that the peeper may be the most common frog in Pennsylvania, for virtually every March puddle harbors a dozen or more vociferous males and a similar number of unobtrusive females. The peeper is so small that it would take over 300 males to weigh one pound! Each slightly larger female attaches about 800 eggs, singly, to grass or other vegetation under water, and the tadpoles, which hatch in less than a week, are ready to transform in late June or July. The scientific name refers to the dark cross on the back, which is visible whether the frog is light tan or dark brown in color. The species is State-wide in distribution, although it has been recorded from only 45 counties.

29. Gray Tree Frog, *Hyla versicolor versicolor*

The trill of the "rain toad" is known to many country dwellers, but few are acquainted with the rough-skinned creature itself. It can change its color from light gray to bright green, but the groin remains orange yellow and a number of dark markings on the back are usually visible. As many as 1500 eggs are deposited in clusters at the surface of ponds and swamps from April to August. The tree frog is rarely seen on the ground, but it assures us of its presence by calling loudly from trees overhead on many moist summer evenings. It occurs throughout the State and has been recorded in 31 counties.

LARGE FROGS—FAMILY RANIDAE

The local representatives of this family are smooth-skinned, medium to large sized frogs. The largest living frog, the Goliath frog of West Africa, which reaches a length of one foot and a weight of thirteen pounds, belongs to this family.

30. Bullfrog, *Rana catesbeiana*

This completely aquatic species lacks the two longitudinal (dorsolateral) folds extending from the eyes to the rump which the other local Ranas display. It is green or greenish brown in color and frequently mottled with darker spots. Up to 20,000 eggs are laid in floating sheets about two feet in diameter. These hatch in about a week but the tadpoles do not transform for two years.

The bullfrog is the only frog specifically protected in Pennsylvania under the Frog and Terrapin Law. In actual practice the provisions of this law are generally extended to include related species merely because few wardens and fewer laymen can tell one frog from another, and not over nine of Pennsylvania's nine million people can tell one tadpole from another. During the open season from July 2 to October 31, excluding Sundays, not over 15 bullfrogs and 15 tadpoles per day may be taken, and the season limit upon the bullfrogs is 50. Originally the bullfrog may have occurred throught the State, but recent records are of little value since considerable restocking has taken place.

31. Green Frog, *Rana clamitans*

This frog may be distinguished from the bullfrog by the strong fold that extends backward from each eye and by the bright green color of the head and upper back. The low pitched call resembles the sound of a plucked bass viol string. From one to four thousand eggs are laid in the water in surface sheets about one foot in diameter, from May to August, and the tadpoles transform in about one year. The green frog occurs throughout the State and has been recorded from 56 counties.

32. Pickerel Frog, *Rana palustris*

This brown frog has two rows of squarish, dark spots on its back, and bright orange on the concealed surfaces of the hind legs. Most frogs call with their heads out of water, but the pickerel frog often croaks or "snores" when submerged. It lays two to three thousand eggs in several globular masses in brooks and marshes in late April or early May. The tadpoles transform in the autumn of the same year. Adults leave the water after breeding and wander about the fields and valleys. The pickerel frog's very glandular skin secretes a poison which makes it distasteful to some snakes and other enemies, and which will kill other frogs placed in the same sack. The species is widely distributed in Pennsylvania, with records for 53 counties.

33. Leopard Frog, *Rana pipiens*

The common grass frog is remembered with mixed feelings by nearly everyone who ever studied biology, but its services to man in aiding science and in pleasing his palate have been legion. It is greenish or brownish in color, with two rows of rounded, dark spots on its back, and no orange under the hind legs. Its reproduction is essentially the same as that of the preceding species but generally more eggs are laid several weeks earlier The species is widely distributed, with records for 36 counties.

34. Southern Wood Frog, *Rana sylvatica sylcatica*

This terrestrial species is prominently marked with a dark patch or mask on each side of the head. The general color varies from dark brown to bright pink and a wash of light green is frequently present on the sides. The wood frog migrates to the water in late March or early April where it is usually associated with spring peepers and spotted salamanders. The repeated snappy *clack* of the wood frog reminds many persons of the quacking of ducks. After several thousand eggs have been laid in rounded masses, its annual honeymoon and bath are completed and it retires to the woods, where it may be met hopping along a leaf-strewn path. There are 47 county records, which indicates a state-wide distribution.

REPTILES—CLASS REPTILIA

Reptiles are cold-blooded backboned animals which breathe by means of lungs, and which have claws on the fingers and toes in those that have fingers and toes. Most reptiles have a body covering of horny scales which are supported in some cases by bony plates. The only local species which do not have scales on the body or legs are the soft-shelled turtles. The majority of living reptiles lay eggs but many species produce living young. Upon hatching or at birth the young resemble the parents and do not pass through a larval stage. At one time in the history of the world reptiles were the ruling group of animals, but there are now only four living orders. One of these—Rhynchocephalia—is represented by a single living species, the tuatara, an animal that somewhat resembles an iguana, and which occurs in small numbers in New Zealand. A second order—Crocodilia—includes the several dozen kinds of alligators and crocodiles. The remaining two orders are represented in Pennsylvania and are discussed here.

TURTLES—ORDER TESTUDINATA

Turtles have short, wide bodies encased in armor. The upper shield is called the *carapace,* and the lower shield, the *plastron.* On each side of the body a wide bridge connects the plastron with the carapace. Modern turtles have no teeth; their powerful jaws are covered with horny sheaths which operate like shears. Only the soft-shells, among local turtles, have fleshy lips. Two pairs of stout limbs are always present, and the toes are more or less webbed in the aquatic species. Scales are usually present on the skin of the soft parts. Upper and lower eyelids and a nictitating membrane protect the eyes. Turtles breathe by means of lungs, but some aquatic kinds are specialized to obtain oxygen from the water. In general, the well-armored species are inoffensive while the poorly-armored species bite savagely.

Turtles abound in warm lowlands with broad meandering rivers and in glaciated areas where lakes are numerous. Pennsylvania's topography is too rugged to provide extensive areas of either type, and hence its turtle population is small, both in number of individuals and in number of kinds. The large marine species which occasionally ascend the Delaware River are not included here.

STINKPOTS—FAMILY KINOSTERNIDAE

The turtles of this family have not been libeled; they have scent glands, near the bridge connecting the upper and lower shells, which secrete a musky fluid.

35. Musk Turtle, *Sternotherus odoratus*

This small aquatic turtle has two yellowish lines on each side of the head, one above the eye and the other below it. Its plastron is much smaller than that of the related mud turtle. It occurs in quiet fresh water, frequently in shallows among cat-tails or other aquatic vegetation. Fewer than ten eggs are laid in June or July, in sand, stumps, or muskrat houses, and a large number of females may lay their eggs at the same spot. This species is a voracious scavenger and probably feeds principally upon insects which have fallen into the water, clams. snails, earthworms, and dead fish. It has been recorded from 20 counties in the non-mountainous portions of the State.

36. Northern Mud Turtle, *Kinosternon subrubrum subrubrum*

This small species displays yellow dots or mottling on the sides of the head and has a much larger plastron than the musk turtle. It is more apt to wander from the quiet, muddy-bottomed waters in which it lives, and it seems equally at home in brackish water. It deposits from two to five eggs in low ground near streams and has much the same feeding habits as the musk turtle. It has been found in 8 counties in the southern half of the State.

SNAPPING TURTLES—FAMILY CHELYDRIDAE

37. Northern Snapping Turtle, *Chelydra serpentina serpentina*

This large aquatic turtle may be readily distinguished from all other local species by its very small under shell (plastron) and by its long, rough tail. Twenty to 40 spherical, hard-shelled eggs, which resemble ping-pong balls, are laid in damp sand, soil, or plant debris in June.

The snapper is of decided economic value, all things considered. Its tastes are so varied that it is beneficial in certain waters or at some seasons. At other times it takes heavy toll of ducks or fish. At all times, however, it provides delicious turtle stew to unbelievably large numbers of Americans.

The snapper probably occurs throughout the State, but it has been recorded from only 37 counties.

POND TURTLES—FAMILY TESTUDINIDAE

Pennsylvania's Terrapin Act is one of the best proofs of the need for scientific names. This act was passed with the laudable intent of protecting certain turtles, but no scientific designation was included, so no one can be certain which species the legislators had in mind. The word "terrapin" is variously defined in different places and by different persons. Herpetologists usually restrict the term to the salt-marsh turtles of the genus *Malaclemys,* the edible diamond-backs of commerce, no species of which occurs in Pennsylvania. Of the local turtles of this family, the wood turtle, which is prized for food, and the box turtle, which is not edible but which is prized as a pet, are most in need of protection.

38. Spotted Turtle, *Clemmys guttata*

This small, semi-aquatic turtle is readily recognized by the presence of 20 to 90 round, bright yellow spots on its black carapace. It frequents swamps and cat-tail bogs and lays two to four elliptical eggs in sand or dirt during June. The species is chiefly insectivorous, has no bad habits (eating creatures we want to eat), and should be protected. It has been found in 27 counties in the non-mountainous portions of the State.

39. Wood Turtle, *Clemmys insculpta*

This large, semi-aquatic turtle is readily recognized by its orange-red legs and rough carapace. It lays a small number of elliptical eggs in the ground during early summer. This species is prone to wander about on land during the summer, feeding upon strawberries and other vegetable matter, but it may also be found in streams where it feeds upon insects, earthworms, and carrion. It is widely used for food and is deserving of careful protection, especially in areas where market hunting is practiced. It has been recorded from 46 scattered counties, but it is most common in the Susquehanna Drainage.

40. Muhlenberg's Turtle, *Clemmys muhlenbergii*

This rare turtle can be recognized by the presence of a large crescentic orange or yellow blotch back of each ear. Little is known about its food and breeding habits. It is an inhabitant of sphagnum bogs and clear meadow streams. In western Pennsylvania it has been found on only a few occasions in Crawford and Mercer counties; in southeastern Pennsylvania it is known in 9 counties, in some of which it is moderately common.

41. Blanding's Turtle, *Emys blandingii*

This turtle may be distinguished by its brilliant yellow chin and throat, and by its domed carapace which is covered with numerous streaks or spots of pale yellow or olive. Six to ten elliptical eggs are laid by this species, which eats snails, crayfish, earthworms, fish, and carrion.

The Carnegie Museum has two specimens from Crawford County, and there are published records for Union and Northumberland counties are well. Since the species is common in the Great Lakes region, I believe that it may occur rarely in western Pennsylvania. The other records may be based upon escaped pets.

42. Eastern Box Turtle, *Terrapene carolina carolina*

This turtle is the only local species which can withdraw its head and limbs completely within its shell and fold both halves of its plastron to form a tight "box." Two to seven eggs are laid in the ground in June or July and the young may not hatch from the eggs until the following spring. The box turtle is omnivorous and even feeds upon poisonous fungi. It is the most terrestrial local species and may be encountered wandering deliberately along sandy ridges in mid-summer. In very dry weather dozens of box turtles may hasten to dwindling ponds to take mud baths. Perhaps these are efficacious, for the species is notoriously long-lived; rare individuals may pass the century mark. The box turtle has been recorded from 44 counties.

43. Map Turtle, *Graptemys geographica*

This aquatic turtle has its carapace covered with a network of fine yellow lines which resemble lines upon a map. The species feeds upon fish, crayfish, insects, snails, and carrion. In June or July from ten to sixteen elliptical eggs are laid in soil or sand; these may not hatch until the following spring. This is a deep-water turtle which is especially hard to catch. It has been recorded from 8 counties in the Erie, Ohio, and Susquehanna drainages.

44. Eastern Painted Turtle, *Chrysemys picta picta*

Like the succeeding form, this turtle has yellow stripes on the head and throat and red markings about the edge of the carapace, but it differs in having a uniform yellow plastron. Its habits are similar to those of the central painted turtle. It has been collected in 9 counties in the Delaware Drainage. Painted turtles from 13 counties in the Susquehanna Drainage are considered to be a mixed population derived from the interbreeding of eastern and central stocks.

45. Central Painted Turtle, *Chrysemys picta marginata*

The painted turtle of western Pennsylvania has a large, dark blotch on its plastron which serves to distinguish it from the preceding form. This is the turtle most frequently seen basking upon logs in Pennsylvania waters. From four to ten eggs are laid in sand or soil in June or July. Painted turtles eat more plant than animal matter but they are important scavengers even so. This race has been recorded from 11 counties in the Ohio and Erie drainages.

46. Red-bellied Turtle, *Pseudemys rubriventris rubriventris*

This large turtle has a high-domed carapace of olive or brown marked with red, and a red or dark orange plastron. It is a shy species which inhabits deep water and is the rarest of all Pennsylvania turtles in museum collections. It has been recorded from Bucks and Lancaster counties only.

SOFT-SHELLED TURTLES—FAMILY TRIONYCHIDAE

The world over, members of the soft-shelled turtle family are extremely easy to recognize because of their soft, pliable "shell" which is devoid of horny shields, their characteristic pancake form, their soft attenuated snouts, and their fleshy lips (hiding sharp jaws)—the last two being features unique among living turtles. Soft-shells are among the earliest Americans—they have been here for at least 80 million years.

47. Spineless Soft-shelled Turtle, *Amyda mutica*

I recently added this turtle to the Pennsylvania list after examining a specimen belonging to the Museum of Comparative Zoology of Harvard University. This specimen was collected in the Allegheny River at Foxburg, Clarion County, sometime prior to 1888. There is a published report, also, of a specimen being taken from the Ohio River near Pittsburgh in 1899.

The spineless soft-shell must not be thought of as timorous. It bites as savagely and effectively as its cousin, but it lacks the row of conical spines along the front edge of the upper "shell" which well-named *spinifera* has.

48. Spiny Soft-shelled Turtle, *Amyda spinifera spinifera*

This completely aquatic species may be readily recognized by its leathery, spiny-edged carapace. Like the snapping turtle it lays spherical, hard shelled eggs. A voracious feeder upon practically all aquatic life, it naturally destroys some fish. I have, on occasion, found the same stream teeming with both fish and soft-shells. Every soft-shell which I have collected I have needed for the Museum so I cannot offer personal testimony that it is the most delicious local turtle. It has been found, infrequently, in 9 counties in the Ohio and Lake Erie drainages only.

SCALED REPTILES—ORDER SQUAMATA

LIZARDS—SUBORDER SAURIA

Lizards usually have two pairs of limbs, a firmly constructed skull with upper and lower jaws firm and well joined together, and a transverse anal opening. The local species possess legs, but one of the common lizards of our southern and central states is legless, and is popularly called the "glass snake." Legless lizards can generally be distinguished from snakes by the presence of movable eyelids, an external opening for the ear, and more than one longitudinal row of scales on the ventral surface. Lizards have teeth, well-developed tongues which may be forked or unforked, and many have fragile tails. As in the salamanders, when the tail is broken a new tail is regenerated—the pieces of broken tail do not reassemble! Lizards are generally silent, but will hiss when annoyed. Most species are active in the daytime. Of the several thousand living kinds, only two species are poisonous; the gila monster of Mexico, Arizona, southern Utah, and Nevada, and the closely related beaded lizard of Mexico. Most lizards lay eggs, but a few produce living young. There is no workable general rule for separating the sexes, but males are frequently more brilliantly colored than females. There are two copulatory organs in males.

IGUANID LIZARDS—FAMILY IGUANIDAE

49. Northern Fence Lizard, *Sceloporus undulatus hyacinthinus*

The fence lizard, or swift, is approaching the northern limits of its range in our State, and although the most common of our lizards it is not seen with such frequency here as it is farther south. It is readily recognizable by its keeled scales, which give it a very rough appearance compared to the polished appearance of the several skinks. Swifts are most common in dry woods and near piles of brush or slashings, where males may often be seen doing push-ups to display their blue chest patches. The species feeds largely upon insects. It has been recorded from 27 counties, mainly in the southern portion of the State.

Skinks—Family Scincidae

50. Black Skink, *Eumeces anthracinus*

The best way to identify skinks is to send them to a museum! Adults are often recognizable but young specimens, which are much easier to catch, often puzzle trained herpetologists. The black skink is characterized, however, by a broad, dark brown stripe on each side of the body. Its habits are only partially known since it is a rare and secretive species, but it is believed to lay as many as eight eggs and to feed largely upon insects and small invertebrates. It has been recorded from Clearfield, Clinton, and Cumberland counties only.

51. Blue-tailed Skink, *Eumeces fasciatus*

This is the skink usually found in Pennsylvania. Young specimens and females display five longitudinal yellow stripes on the body and the young have a brilliant blue tail. In adult males the stripes are very indistinct or absent and the head is broadened and reddish in color. Old sawdust piles are a favorite habitat for this species. Two to fifteen small eggs with thin leathery shells are laid in summer and the female generally remains with the eggs. This species feeds upon insects, spiders, roaches, and new-born mice. It has been recorded from 15 counties, mainly in central Pennsylvania.

52. Broad-headed Skink, *Eumeces laticeps*

This species resembles the blue-tailed skink in coloration except that old males develop much larger and redder heads. It inhabits drier places, is largely arboreal, and reaches a much greater size. Six or seven eggs are laid and brooded by the females. The only specimen known to have been collected in Pennsylvania was found at York Furnace, York County.

SNAKES—SUBORDER SERPENTES

Snakes are elongate reptiles without external limbs, without movable eyelids, without external ear openings, and with loosely constructed skulls and jaws. They are covered with smooth or keeled scales, which are arranged in definite rows and usually overlap. In the majority of species there is a single row of large transverse scales or scutes (ventrals) on the undersurface extending from the chin to the anal opening; from this point backward the scutes (caudals) are generally divided into two rows. The tongue is long, forked, and can be protruded from the open or closed mouth. It is used for smelling and not as a "feeler" or "stinger." If the tail is injured or amputated it does not grow again. Only a small proportion of the living species of snakes are poisonous. Of the poisonous kinds, some have short, solid, grooved fangs in the rear of the upper jaw and are slightly poisonous; some have solid, grooved fangs in the front of the upper jaw (cobras and sea snakes) and are dangerously poisonous; and some have large movable fangs in the front of the upper jaw (vipers and pit-vipers) and are dangerously poisonous. Many snakes are active in daytime, but poisonous snakes, water snakes, and some other local species do much of their feeding at night. Many snakes lay large eggs with leathery shells in suitable places on land, but others produce living young which are generally extruded from the body of the female enclosed in a cellophane-like covering which they rupture shortly after birth. Male snakes have two copulatory organs and usually longer tails than females of the same size.

COLUBRID SNAKES—FAMILY COLUBRIDAE

This family includes the majority of living snakes.

53. Eastern Worm Snake, *Carphophis amoena amoena*

The tiny worm snake has smooth scales and looks as if its brown back and bright pink belly had been waxed. It is addicted to burrowing but often secretes itself under the bark of logs or beneath stones in damp, forested areas. The snake is sometimes numerous under the slashings scattered on the ground around an old sawdust pile. In July each female lays two to five eggs about one-third of an inch thick and almost an inch long. These hatch about two months later and 4-inch snakelings appear. The worm snake feeds chiefly upon earthworms and grubs. I do not know of any place in Pennsylvania where this snake is as numerous as it is in the states south of us, but it has been found in 13 scattered counties.

54. Northern Ring-necked Snake, *Diadophis punctatus edwardsii*

This smooth-scaled snake is readily recognized by the yellow or orange ring which encircles its neck. Those who deign to examine it more closely will note that the belly is also yellow or orange, and the upper surface uniform slate color. It is commonly found in wooded areas where it feeds upon insects, earthworms, salamanders, and frogs. It lays from one to seven 2-inch eggs in June or July, from which 5-inch snakelings hatch in about two months. It has been recorded from 49 counties.

55. Northern Hog-nosed Snake, *Heterodon contortrix contortrix*

This widely feared, but entirely harmless, snake is most commonly encountered on sandy beaches and mountain ridges. Its slightly upturned snout renders identification easy. It feeds upon toads and frogs almost exclusively and in early summer lays several dozen eggs which hatch in about two months. The characteristic hissing, striking, and neck-spreading performance of this snake has contributed to the erroneous notion that it is venomous. If the public does not learn that the "spreadhead" is nothing but a big bluff and desist from killing every specimen encountered, this interesting snake will be exterminated before long. It has been recorded from 23 counties.

56. Rough Green Snake, *Opheodrys aestivus*

This extremely slender, bright green snake has keeled scales which distinguish it from the following species. It is usually found in low vines, shrubs and trees, rarely on the ground. It feeds principally upon insects, especially caterpillars, and upon spiders. Four to nine inch-long eggs are laid in July and hatch in September. This is essentially a southern snake approaching its northern limit in Pennsylvania. It has been found in only 8 counties, along the Monongahela, Susquehanna, and Delaware river valleys, which it has followed northward.

57. Eastern Smooth Green Snake, *Opheodrys vernalis vernalis*

This smooth-scaled, brilliant green snake inhabits both woods and fields, where it feeds largely upon insects. It is so commonly encountered in grass that it is often called the "grass snake," but it may ascend *low* bushes on occasion. This snake is so gentle that it can scarcely be induced to bite, and it would make an ideal snake pet for children if it fed more readily in captivity. It lays from 3 to 11 eggs in July or August, which normally hatch in less than a month. Recorded from 42 counties.

58. Black Racer, *Coluber constrictor constrictor*

This, the second largest Pennsylvania snake, is a satiny blue-black when grown, but young racers have a pattern of blotches and are often mistaken for some other species. It occurs in a variety of situations, often in the tops of low bushes or trees, and when cornered it will bite viciously. During the breeding season in May, courting black racers may make short dashes toward intruders. Anyone so frightened usually lengthens the distance with each passing year until grandchildren are regaled with the story of the blacksnake that chased grandpa for half a mile! Insects and mice are the principal foods, but frogs, snakes, and birds are also eaten. In spite of its misleading scientific name, the racer does not constrict its prey. This species is of definite economic value, since it consumes large numbers of mice and insects and some other snakes. One to two dozen eggs are laid in June or July in ground, sawdust, or decaying wood, and the young snakes, 8 to 12 inches long, hatch in August. The racer has been recorded from 47 counties.

59. Pilot Blacksnake, *Elaphe obsoleta obsoleta*

This, the largest Pennsylvania snake, has a few rows of faintly keeled scales down the center of the back and its black color is frequently interrupted by faint crossbars of white, yellow, or red. People generally confuse the pilot and the racer, or, oftentimes, fail to realize that there are two kinds of "blacksnakes" in Pennsylvania. Bear in mind that the pilot is shiny black, often with faint markings of other colors, whereas the racer is satiny gun-metal blue without any blemish of pattern. The pilot blacksnake is a powerful constrictor which feeds largely upon rodents, secondarily upon birds, eggs, snakes, and lizards. In the chicken yard or game bird hatchery it is economically detrimental. Its consumption of rodents is so great, however, that each specimen is worth *at least* five dollars to the farmer, and even more to the orchardist. The pilot is frequently found associated with the copperhead or timber rattlesnake, but it does not "pilot" these species. In July it lays from one to two dozen eggs in earth, sawdust, or manure piles, and 14-inch snakelings hatch several months later. Young pilots, like young racers, are blotched. In most parts of Pennsylvania the pilot greatly outnumbers the racer. It has been recorded from 50 counties.

60. Northern King Snake, *Lampropeltis getulus getulus*

King snakes are poor mountain climbers, so this lowland, southerly species barely enters Pennsylvania, having been found in Lancaster County on only one or two occasions. It is black in color with narrow yellow or white cross bands which fork on the sides, giving rise to the name "chain snake." King snakes are immune to the venom of associated poisonous snakes and they are great rodent eaters as well, so any king snake anywhere should be allowed to go its way unmolested. The king snake is most common in large river or creek valleys, and it is killed in large numbers by automobiles on highways passing through regions where it is abundant. From 10 to 24 eggs are laid and hatching occurs in about six weeks.

61. Upland House Snake, *Lampropeltis triangulum triangulum*

The house snake is nicely marked with a series of brown or red-brown blotches above and a checkerboard arrangement of black and white on its belly. It scales are smooth and polished, so it may be readily distinguished from the rough-scaled copperhead with which it is frequently confused. It is sometimes called the "milk snake" because of a false notion that it milks cows. Like its relative the king snake, it feeds largely upon rodents and other snakes. It is one of the most beneficial of local species and should be accorded protection. It lays less than two dozen eggs, in June or July, which hatch in about two months into brightly patterned little "spotted adders," which are usually killed by every person old enough to hold a club. The house snake has been recorded from all Pennsylvania counties except Cameron, Lackawanna, and Wyoming. The population in extreme southeastern Pennsylvania (Chester, Delaware, Montgomery, and Philadelphia counties) is a mixed one resulting from admixture with the coastal plain house snake, *Lampropeltis triangulum temporalis.*

62. Kirtland's Water Snake, *Natrix kirtlandii*

This small water snake has a red belly with two rows of round black spots and a pattern of more or less distinct dark blotches on the upper surface. Earthworms and slugs are the principal food. Five to eleven young are born in August or September. This is either one of the rarest snakes in Pennsylvania or local snake hunters have not learned the technique of finding it. It was taken in Allegheny County in 1897 and 1906; then not again until a grown female was found on the wooded edge of a yard near Wilkinsburg in 1941! The species has been recorded from Allegheny, Butler, Delaware, and Westmoreland counties only.

63. Queen Water Snake, *Natrix septemvittata*

This species lacks any markings on the upper part of the body except for occasional faint black stripes. A yellowish stripe extends along each side of the body and two brown stripes occur on the under surface. The queen water snake is rarely found far from water, where it feeds especially upon crayfish. This snake destroys few fish and should not be killed during vermin campaigns which are directed against the next species. Litters numbering about ten young are born in August. Recorded from 28 counties, in the non-mountainous portions of the State.

64. Northern Banded Water Snake, *Natrix sipedon sipedon*

This common species displays dark blotches on its sides and back and usually has dark half-moon markings on the belly scales. It is unquestionably destructive of fish, but experiments in tanks indicate that when a choice is available the banded water snake will eat non-game species in preference to game fish. It should be killed in the vicinity of hatchery ponds and possibly along certain fishing streams, but care should be exercised to restrict killing to this species alone. As many as 44 young may be produced by one female. Recorded from 55 counties.

65. DeKay's Brown Snake, *Storeria dekayi dekayi*

This small serpent has keeled scales and a double row of faint blackish spots which border a central light stripe. DeKay's snake hides so successfully that it remains numerous even in large cities like Philadelphia and Pittsburgh, often hiding under trash in vacant lots. It feeds largely upon slugs, snails, earthworms, and insect larvae. Each adult female gives birth to 9 to 20 four-inch young in late summer. The species has been found in 37 counties.

66. Northern Red-bellied Snake, *Storeria occipitomaculata occipitomaculata*

This snake has keeled scales, three faint gray blotches encircling the neck, and a belly which is red in most specimens, but occasionally bluish-black. Slugs, earthworms, and insect larvae are the principal food, and litters of about 1 to 7 tiny young are produced in August or September. Although both Storerias may be found under the same board occasionally, the red-bellied is generally the more common species in northern or mountainous sections, and DeKay's is the dominant species in the warmer and drier valleys and southerly areas. It is not surprising, therefore, that the red-bellied is rare or absent in southeastern Pennsylvania although it has been taken in 34 counties elsewhere.

67. Eastern Ground Snake, *Haldea valeriae valeriae*

This, our smallest Pennsylvania snake, has a gray or brown back, sometimes sprinkled with a number of black dots, and a whitish or pale yellowish belly. The scales may be either smooth or faintly keeled, and in either 15 or 17 rows. A western Pennsylvania female gave birth to five 4-inch youngsters on September 13. Both mother and young ate earthworms so long as the earthworms offered to them were smaller than the snakes! The ground snake is so retiring that it may have escaped notice in many places where it occurs; it has been found in 7 counties thus far.

68. Small-headed Garter Snake, *Thamnophis brachystoma*

This species has three longitudinal yellow stripes as do the other local species of *Thamnophis,* but its very small head is distinctive. It feeds upon earthworms, small frogs, and small fish. Litters of five or more young are born in July or August.

The small-headed garter snakes from Wisconsin to Pennsylvania were formerly classed together as Butler's garter snake. Mr. Albert G. Smith has recently concluded that the easternmost population has a constantly shorter head and thinner body and is, therefore, entitled to a name of its own. This restricted species has been recorded only from Clarion, Forest, McKean, Mercer, Venango, and Warren counties, Pennsylvania, and from Cattaraugus and Chautauqua counties, New York.

69. Eastern Ribbon Snake, *Thamnophis sauritus sauritus*

Three bright yellow stripes are usually very pronounced against the dark ground color of this species. The tail is very long and slender as compared to that of the eastern garter snake. The species is most common in swamps and other damp situations, where it often eludes capture by diving into the water. It feeds largely upon salamanders, although tadpoles, small frogs, insects, and fish may be consumed at times. Litters of 5 to 20 young are produced in July or August. The ribbon snake has been recorded from 30 counties.

70. Eastern Garter Snake, *Thamnophis sirtalis sirtalis*

The yellow longitudinal stripes are sometimes obscured in the garter snake by a pattern of numerous dark spots. This species is probably the most common snake in Pennsylvania, occurring in a wide variety of habitats. The principal foods are frogs, toads, fish, and earthworms. Litters of from 14 to 40 are customarily produced, but there is a record of one large female who had a family of 78! The garter snake has been recorded from every county in Pennsylvania, except Juniata, Montour, and Schuylkill.

PIT-VIPERS—FAMILY CROTALIDAE

All of the species of this family are venomous.

The three Pennsylvania species of poisonous snakes have keeled scales and a pit on each side of the head between the eye and the nostril. These snakes are feared out of all proportion to the actual injuries which they cause. Statistics prove that bath-tubs cause many more serious accidents in the United States than do poisonous snakes. The local species are largely nocturnal. The wearing of stout boots in snake-infested areas provides adequate protection for the legs. Modern suction kits for the treatment of snake-bite accidents contain excellent instructions and materially lessen the suffering of persons who are bitten. There are probably fewer than fifty cases of snakebite in Pennsylvania each year, and deaths average less than one per per year. Many more persons suffer from snake fright than from snakebite!

71. Northern Copperhead, *Agkistrodon mokeson mokeson*

The copperhead is the only local snake which has triangular brown or red-brown blotches along each side of the body *with the base of the triangle toward the ground.* If a copperhead is skinned and the hide flattened out, these triangles, with their points in contact, will produce a series of hourglass-shaped figures. *No other snake in Pennsylvania has such a distinctive pattern.* The copperhead is largely nocturnal, and hence relatively few accidents occur, in spite of its prevalence even in urban areas. Mice, frogs, and birds are the principal foods, although many other items have been found in copperhead stomachs. Pennsylvania females produce from 4 to 9 young between August 23 and September 18.

The copperhead has been recorded from 53 counties in Pennsylvania, but in the glaciated areas it is either absent or confined to the large stream valleys.

Average size—about thirty inches; maximum size of Pennsylvania specimens—about forty-two inches; maximum size recorded in literature—fifty-three inches.

72. Eastern Massasauga, *Sistrurus catenatus catenatus*

This rare snake has the top of its head covered with large plates, which serve to distinguish it from the timber rattler, which has numerous small scales on the head. It has a small rattle and a central row of squarish spots along the back. The massasauga feeds largely upon frogs and mice. It produces from 5 to 9 young in August or September. This snake is essentially a prairie form which managed to spread eastward to western Pennsylvania. It has been recorded from Allegheny, Butler, Crawford, Lawrence, Mercer, and Venango counties only.

73. Timber Rattlesnake, *Crotalus horridus horridus*

This, the largest local poisonous species, has a pattern of black chevron-shaped blotches across the body. The ground color ranges from sulphur-yellow to jet black, but these colors cannot be correlated exactly with sex. The rattlesnake is most common in sparsely settled mountainous regions, but in late summer it frequently descends into the valleys to obtain water. From 7 to 12 young are born in September. The timber rattlesnake feeds almost exclusively upon warm-blooded prey, of which rodents and birds are the chief constituents. It has been recorded from 44 counties, but it is now extinct in some of these, such as Allegheny. Maximum size in Pennsylvania—about five feet.

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